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Application No. **09/885,013**

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Comments:

At col. 2, line 25, "inkjet" should read --ink-jet--.

METHOD OF PRODUCING SCALE FOR DETECTING CONVEYANCE ROTATION ANGLE OF CONVEYING ROLLER AND RECORDING APPARATUS USING THE SCALE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the detection of a rotation angle of a conveying roller in a recording apparatus.

2. Related Background Art

Generally speaking, recording apparatuses, such as printers, copying machines, and facsimile apparatuses, record an image consisting of a dot pattern on a recording sheet, such as a paper sheet or a thin plastic plate, by driving an energy generator of a recording head in accordance with image information.

Such recording apparatuses can be classified, in terms of recording system, into ink-jet type apparatuses, wire-dot type apparatuses, thermal type apparatuses, laser-beam type apparatuses, etc. Of these, in the ink-jet-type recording apparatuses, recording is effected by discharging droplets of ink (recording liquid) from discharge holes of a recording head and causing them to adhere to a recording sheet.

Further, in terms of recording mechanism construction, such apparatuses can be classified into full-line type and serial type apparatuses. A full-line type apparatus has a recording means comprising recording elements arranged over the entire recording width range extending perpendicular to the recording sheet conveying direction, recording being performed by moving the recording sheet in the sub scanning direction (the recording sheet conveying direction). In a serial type apparatus, recording is effected by performing scanning with a recording means mounted on a carriage movable in the main scanning direction and moving the recording sheet in the sub scanning direction. In particular, the serial type apparatus, which needs no such wide recording means as used in the full-line type apparatus, is relatively inexpensive and is now in widespread use.

Conventionally, an open loop control system using a stepping motor has been mainly adopted in the means for moving the recording sheet in the sub scanning direction, i.e., the so-called sheet conveying means. Recently, however, there is an increasing demand for high image quality, and it is rather difficult to meet this demand with the open loop control system. In view of this, adoption of a feedback control system is required in which, to effect high-quality conveyance control, the rotation angle of the conveying roller when conveying the recording sheet is detected to control the rotation of the conveying roller, etc.

However, while it is desirable that an encoder wheel on which a scale is written (formed) in advance be mounted to the conveying roller such that their centers of rotation (axes) coincide with each other, generation of offset between the center of rotation of the conveyance outer peripheral portion of the conveying roller and the center of rotation of the detecting portion of the encoder wheel cannot be avoided because of the play between the mounting holes and the encoder wheel, etc.

SUMMARY OF THE INVENTION

The present invention has been made with a view toward solving the above problem in the prior art. It is accordingly an object of the present invention to provide a method for producing a scale for detecting the conveyance rotation angle of a conveying roller in which it is possible to cancel the part tolerances of an encoder for use in the conveying roller, the offset at the time of assembly thereof, etc., and a recording apparatus using the scale thus produced.

Another object of the present invention is to provide a method for producing a scale provided coaxially with a conveying roller and adapted to detect conveyance rotation angle, wherein a recording medium conveyance outer peripheral portion of the conveying roller is held, and wherein rotation angle allotment is effected on the conveying roller to thereby form a scale for detecting conveyance rotation angle.

Still another object of the present invention is to provide a recording apparatus comprising a conveying means including a conveying roller having a scale for detecting conveyance rotation angle formed by holding a recording medium conveyance outer peripheral portion of the conveying roller and effecting rotation angle allotment on the conveying roller and a pinch roller in press contact with the conveying roller, and a detecting means for detecting a conveyance rotation angle of the conveying roller, wherein recording is effected by a recording means on a sheet conveyed by the conveying means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating an inkjet recording apparatus according to a first embodiment of the present invention; ink-jet

FIG. 2 is a schematic sectional view of the apparatus of FIG. 1;

FIG. 3 is a detailed view showing the construction of a means for detecting a conveyance rotation angle of a conveying roller for use in conveyance control of the recording apparatus of this embodiment;

FIG. 4 is a sectional view of a main portion of the means for detecting the conveyance rotation angle of the conveying roller for use in conveyance control of the recording apparatus of this embodiment;

FIG. 5 is a control block diagram of the recording apparatus of this embodiment;

FIGS. 6A, 6B, 6C and 6D are explanatory diagrams illustrating the mounting of a conveyance rotation angle detecting element for the conveying roller of this embodiment;

FIG. 7 is a block diagram illustrating a magnetizing device used in a scale producing method according to this embodiment;

FIG. 8 is a block diagram illustrating a writing device used in a scale producing method according to a second embodiment of the present invention;

FIG. 9 is a sectional view of a main portion of a conveying roller angle detecting means for use in conveyance control of a recording apparatus according to the second embodiment;

FIG. 10 is a block diagram illustrating a writing device used in a scale producing method according to a fourth embodiment of the present invention; and

FIG. 11 is a diagram showing a main portion of a conveying-roller-conveyance-rotation-angle detecting means for use in conveyance control of a recording apparatus according to the fourth embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following, an ink-jet recording apparatus according to an embodiment of the present invention will be described along with various further embodiments.